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The Twenty-Second Symposium
Held May 7–11, 2000, in Gatlinburg, Tennessee

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Introduction to the Proceedings of Biotechnology for Fuels and Chemicals: The Twenty-Second Symposium

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Biotechnology for Fuels and Chemicals: The Twenty-Second Symposium was held May 7–11, 2000 in Gatlinburg TN. This field is clearly in an expansion mode, with a window of opportunity for implementing many of the approaches presented at the meeting. The focus of the meeting is to improve the technology and the economics of producing the fuels and chemicals vital to many industrial sectors. This meeting allowed representatives of the industrial, academic, and government sectors to exchange information and ideas in formal and informal settings. Attendance at the conference is split almost equally among industrial, US academic, foreign, and national lab participants, totaling over 200 attendees. The conference, affectionately known as the Gatlinburg conference, has been the longest-standing and best meeting to attend to find out current trends in bioprocessing to produce fuels and chemicals and, equally important, to meet active participants and companies in the field. The conference has an interdisciplinary focus on bioprocessing, but has multidisciplinary interests from plant production to utilization. The conference also attempts to cover basic scientific research, engineering development, and the bridging to deployment efforts in bioprocessing for both fuels and chemicals.

“The Technology Roadmap Plant/Crop-based Renewables Resources 2020” identifies biotechnology as a critical approach to moving into new technology. We broadened the meeting scope in Session 1, “Feedstocks Production, Modification, and Characterization,” to encompass plant genetics and metabolism for altered composition as well as the production, collection, consistency, and availability of renewable feedstocks (agricultural and energy crops) for fuels and chemicals. Sessions 2 and 3 are the core of the meeting—“Applied Biological Research” examined new biocatalysts

using enzyme, microbial, and plant biochemistries and genetic engineering and "Processing Research" described the conversion of plant components via integration of microbiology, biochemistry, and chemistry with engineering, separations, and hybrid systems. The "Enzymatic Processes and Enzyme Production" session focused on the manufacture and use of enzymes. The "Industrial Chemicals" session emphasized recent developments in the integrated production and scale-up of chemicals from biological rather than petrochemical routes. Special interest was on separation methods and their integration into new fermentation or hybrid processes. The technical program consisted of 35 oral presentations, a roundtable forum, two special topic discussions, and a poster session of 135 posters.

We continued a successful informal roundtable series with "Bioenergy and Bioproducts: Forum on Recent Government Initiatives," which discussed the President's Executive Order, the Bioenergy Initiative, the Technology Roadmap for Renewables Vision 2020, and other thrusts. These events continue the strong industrial focus and active industrial participation in the organizing committee. This has become very popular because it allows industrial and government participants to speak more openly.

A special Topics Discussion Group was held on "CO₂ Sequestration," led by James W. Lee. Another one was held on "Commercialization of Biomass-to-Ethanol" where chairs Jack N. Saddler and David J. Gregg made the goal of this workshop to show participants that we are close to demonstrating the technical viability of an integrated biomass-to-ethanol process and that progressive technical advances and policy decisions will likely greatly enhance the economic attractiveness of the process.

To stretch our perspectives and new biotechnology and to better appreciate our surroundings, Dr. Frank Harris of "Discover Life in America" spoke at the banquet on the "All-Taxa Survey of the Great Smoky Mountains National Park: What it is and why."

The 2000 Charles D. Scott Award for Distinguished Contributions in the field of Biotechnology for Fuels and Chemicals was presented to Dr. Karl Grohmann, Lead Scientist for US Department of Agriculture at the US Citrus and Subtropical Products Research Laboratory in Winter Haven, FL. His research focus is the production of value-added commodities from peel and other by-products of citrus processing. Prior to 1991, Dr. Grohmann worked at the National Renewable Energy Laboratory (NREL), then the Solar Energy Research Institute (SERI), in Golden, CO. During his 12-year stay at NREL, Dr. Grohmann was responsible for leading research efforts in biological conversion of cellulosic biomass to ethanol and biogas. Dr. Grohmann earned a chemical engineering diploma from the Institute of Chemical Technology in Prague, Czechoslovakia, and a Ph.D. in chemistry from the University of Houston, TX. He has attended the annual Symposium on Biotechnology for Fuels and Chemicals since 1984 and has shared in organizing and chairing a number of oral and poster sessions. Dr. Grohmann has co-authored over 110 peer-reviewed publications and 12 patents dealing primarily with various aspects of biotechnology for biomass conversion. He has also co-authored over 40 technical reports and has made numerous presentations at national and international scientific meetings.

In addition, he served as the US technical representative for the International Energy Agency Network on Biotechnology for the Conversion of Lignocellulosics. This award is named in honor of Dr. Charles D. Scott, the founder of this Symposium and its chair for the first ten years.

Organization of the Symposium was as follows:

Organizing Committee

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 Mark Finkelstein, *Conference Co-Chair, National Renewable Energy Laboratory, Golden, CO*
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Session Chairpersons and Co-Chairpersons

Session 1: Feedstocks, Production, Modification, and Characterization

Vincent Chiang, *Michigan Technological University, Hancock MI*
 J. S. McLaren, *Ph.D., Inverizon International Inc., Chesterfield, MO*

Session 2: Applied Biological Research

Peter Rogers, *University of New South Wales, Sydney, Australia*
 Barbara R. Evans, *Oak Ridge National Laboratory, Oak Ridge, TN*

Session 3: Bioprocessing Research

Thomas R. Hanley, *Ph.D., University of Louisville, Louisville, KY*

Session 3: Bioprocessing Research (continued)

David N. Thompson, *Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID*

Session 4: Bioenergy and Bioproducts:**Forum on Recent Government Initiatives**

Robert A. Harris, *US Department of Energy, Washington, DC*

Bruce E. Dale, *Michigan State University, East Lansing, MI*

Session 5: Industrial Chemicals

Michael Cockrem, *Ph.D., KiwiChem International, Madison, WI*

Manoj Kumar, *Genencor International Palo Alto, CA*

Session 6: Enzymatic Processes and Enzyme Production

Jeff Tolan, *Iogen Corporation, Ottawa, Ontario*

David Short, *DuPont, Inc., Newark, DE*

Poster Session

Nhuan P. Nghiem, *Oak Ridge National Laboratory, Oak Ridge, TN*

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2. "Proceedings of the Second Symposium on Biotechnology in Energy Production and Conservation" (1980), *Biotechnol. Bioeng. Symp.* **10**.
3. "Proceedings of the Third Symposium on Biotechnology in Energy Production and Conservation" (1981), *Biotechnol. Bioeng. Symp.* **11**.
4. "Proceedings of the Fourth Symposium on Biotechnology in Energy Production and Conservation" (1982), *Biotechnol. Bioeng. Symp.* **12**.
5. "Proceedings of the Fifth Symposium on Biotechnology for Fuels and Chemicals" (1983), *Biotechnol. Bioeng. Symp.* **13**.
6. "Proceedings of the Sixth Symposium on Biotechnology for Fuels and Chemicals" (1984), *Biotechnol. Bioeng. Symp.* **14**.
7. "Proceedings of the Seventh Symposium on Biotechnology for Fuels and Chemicals" (1985), *Biotechnol. Bioeng. Symp.* **15**.

8. "Proceedings of the Eighth Symposium on Biotechnology for Fuels and Chemicals" (1986), *Biotechnol. Bioeng. Symp.* **17**.
9. "Proceedings of the Ninth Symposium on Biotechnology for Fuels and Chemicals" (1988), *Appl. Biochem. Biotechnol.* **17,18**.
10. "Proceedings of the Tenth Symposium on Biotechnology for Fuels and Chemicals" (1989), *Appl. Biochem. Biotechnol.* **20,21**.
11. "Proceedings of the Eleventh Symposium on Biotechnology for Fuels and Chemicals" (1990), *Appl. Biochem. Biotechnol.* **24,25**.
12. "Proceedings of the Twelfth Symposium on Biotechnology for Fuels and Chemicals" (1991), *Appl. Biochem. Biotechnol.* **28,29**.
13. "Proceedings of the Thirteenth Symposium on Biotechnology for Fuels and Chemicals" (1992), *Appl. Biochem. Biotechnol.* **34,35**.
14. "Proceedings of the Fourteenth Symposium on Biotechnology for Fuels and Chemicals" (1993), *Appl. Biochem. Biotechnol.* **39,40**.
15. "Proceedings of the Fifteenth Symposium on Biotechnology for Fuels and Chemicals" (1994), *Appl. Biochem. Biotechnol.* **45,46**.
16. "Proceedings of the Sixteenth Symposium on Biotechnology for Fuels and Chemicals" (1995), *Appl. Biochem. Biotechnol.* **51/52**.
17. "Proceedings of the Seventeenth Symposium on Biotechnology for Fuels and Chemicals" (1996), *Appl. Biochem. Biotechnol.* **57/58**.
18. "Proceedings of the Eighteenth Symposium on Biotechnology for Fuels and Chemicals" (1997), *Appl. Biochem. Biotechnol.* **63-65**.
19. "Proceedings of the Nineteenth Symposium on Biotechnology for Fuels and Chemicals" (1998), *Appl. Biochem. Biotechnol.* **70-72**.
20. "Proceedings of the Twentieth Symposium on Biotechnology for Fuels and Chemicals" (1999), *Appl. Biochem. Biotechnol.* **77-79**.
21. "Proceedings of the Twenty-First Symposium on Biotechnology for Fuels and Chemicals" (2000), *Appl. Biochem. Biotechnol.* **84-86**.

This symposium has been held annually since 1978. We are pleased to have the proceedings of the Twenty-Second Symposium currently published in this special issue to continue the tradition of providing a record of the contributions made.

The Twenty-Third Symposium is planned for May 6–10, 2001, in Breckenridge, CO. More information on the 22nd and the 23rd Symposia are available at their websites—[www.ct.ornl.gov/symposium] and [www.nrel.gov/biotech_symposium]. We encourage comments or discussions relevant to the format or content of the meetings.

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